

**Remarks/Arguments**

Applicants have received and carefully reviewed the Office Action mailed on February 2, 2006. Claims 1-27 remain pending, with claim 27 being newly presented. Reconsideration and reexamination are respectfully requested.

As a preliminary matter, claims 12, 18 and 22 have been amended to correct syntax by including the word "and". No new matter is added.

On page 2 of the Office Action, claims 6, 7, 11, 14, 16, 24 and 26 were objected to under 37 CFR 1.75(c) as being of improper dependent form. Applicants note that each of claims 6, 7, 11, 14 and 16 recites a controller for a boiler system configured to perform the method steps of another claim. In each instance, the corresponding base claim recites a method, which may or may not be implemented in a "controller". As such, each of these claims clearly recites an element (e.g. the controller) that is not recited in the base claim. Likewise, claim 24 recites a boiler system including a controller configured to perform the method of claim 18. Again, the method of claim 18 may or may not be implemented in a "controller". Because each of these claims recites an element that is not recited in the corresponding base claim, it is believed that the objections raised on page 2 of the Office Action should be withdrawn.

On page 2 of the Office Action, claims 1-4, 6-12, 15, 18-22 and 24-26 were rejected under 35 U.S.C. §102(a) as being anticipated by U.S. Patent No. 6,647,302 to Pouchak (hereinafter, Pouchak '302).

Claim 1 recites:

1. A method of operating a boiler system having a plurality of stages which may be active or inactive at a given time, the stages having outputs, the method comprising:
  - performing a staging sequence to determine how many of the plurality of stages should be active;
  - modulating a first stage to operate at less than 100% of its output; and
  - modulating a second stage to operate at less than 100% of its output.

The Examiner cites a lengthy passage of Pouchak '302, which reads as follows:

Boiler systems that utilize a number of modular boilers require a control system that provides for the sequencing of the modular boilers. Certain aspects of fault tolerant multi-node stage sequencing controller 200 were partially explained in relation to arbitration logic module 102a in the explanation of the use of HIP 100 with multiple boilers. The operation of sequencing controller 200 may be represented as illustrated in FIG. 5 including a Sequencer Node 300 and a stage

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node 380. Sequencer node 300 is a temperature control device that monitors the system control temperatures and makes decisions to actively manage multiple-stage node analog control level and on/off stage decisions changes such as adding and removing functioning stages. Sequencer node 300 includes sequencer 302, Runtime & Mode Stage Controller 304, Stage Status Array 306, temperature controller 308, stager 310, analog stage control 312, mode controller 314, and Network Interface 316. In operation, temperature controller 308 provides firing rate temperature demand signal 320 to analog stage controller 312 and stage temperature demand signal 322 to stager 310. Sequencer module 302 receives number of stages required signal 324 from stager 310 and provides sequencing information signal 326 to runtime and Mode stage controller 304. Mode controller 314 receives temperature control status signal 328 and provides mode status signal 330. Mode controller 314 provides mode status signal 332 to runtime and mode stage controller 304 and mode signal 334 to network interface 316. Analog stage controller 312 provides firing rate system signal and status signal 336 to runtime mode stage controller 304. Stage status array 306 receives stage number and firing rate signals 338 from runtime and mode stage controller 304 and provides stage status signal 340 to controller 304. Stage status array 306 receives boiler identification (ID), mode and run time information signal 342 from interface controller 316 and provides communications formatted signal 344 to controller 316.

Stage Node 330 is an active communications and control node that interfaces to an active energy source. In the context of boiler systems, stage node 330 may be a boiler interface controller such as BIC 10 that interfaces to a flame safety controller 30 and to various sensors, boiler safeties and status signals as previously described herein. Stage node 330 implements decisions made in sequencer node 300 algorithms for control relating to analog firing rate and the addition or deletion of a stage. Information on runtime, control status, and safeties is communicated back to Sequencer Node 300.

The present invention is a multi-node sequencing controller (based on stage runtime), which uses the runtime and node stage controller piece to process unique data-collecting information stored in the stage data array. Though the use of the decision technique implemented in the runtime and mode stage controller, operations and total runtime hours from the modular stages are reflected in decisions to request control actions for the modular heat units in the system. This allows dynamic load balancing as problems affect single and multiple modular heating nodes.

Sequencing controller 200 provides a method to control dynamic loading and staging of boiler stage node functionality such as mode progression monitoring, pre-purge speed, pre-ignition speed control, Heat evaluation mode, and post purge ignition shutdown capabilities. By proper boiler system design, all mode monitoring and transitions present in the stage node can be implemented without interfering with the sequencer nodes staging requests. In addition, if any errors or

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faults occur in stage node 380, then sequencer node 300 can dynamically adjust the control of the remaining multiple stages individually of a high efficiency condensing, automatic bypass control, modulating firing rate boiler by taking into account the failed status and readjusting the load dynamically independent of the source control algorithm.

Referring to FIG. 6, periodically sequencer 200 broadcasts a nvoSeqShare message 286 globally to all the nodes, however each nvoSeqShare message is intended for a specific node address and the message contains this specific node address. Similarly all stage nodes broadcast their nvoModBoilerShare message 288 back to sequencer 200 where the message is decoded. Sequencer node 300 uses an efficient array to collect and rank boiler interface controllers based on the runtime and mode stage controller. A more complete understanding of the Sequencer invention may be obtained from Pseudocode included as an Appendix and the following information regarding data structure herein.

Data structure 1, Stage Array [0 to 16] in Sequencer

(Pouchak '302 at column 13, line 30, to column 14, line 47.) With respect to claim 1, it is clear that the Examiner has failed to identify with any specificity where many of the steps are disclosed or suggested in the above-referenced passage of Pouchak '302, including for example, the steps of modulating a first stage to operate at least than 100% of its output and modulating a second stage to operate at less than 100% of its output. Applicants are unable to determine where the Examiner is suggesting that these steps are disclosed, due to the very terse format of the Office Action. It is axiomatic that the burden of establishing a *prima facie* case of unpatentability lies with the Examiner, and it is believed that this burden has not been met. For these and other reasons claim 1, along with dependent claims 2-4, 6 and 7, are believed to be clearly patentable over the cited reference.

Similar comments apply to independent claim 8, which recites the steps of performing a staging sequence to determine which of the plurality of stages should be active or inactive, and modulating the active stages. These steps do not appear to be disclosed in the above-referenced passage of Pouchak '302. Applicants also note that the method recited in claim 9, which calls for modulating each active stage to substantially the same level of modulation, does not appear to be addressed at all in the Office Action. For these and other reasons, claim 8 along with dependent claims 9-11, are also believed to be clearly patentable over the cited reference.

Claim 12 recites, in part, the steps of performing, at a first interval, a staging sequence to determine how many of the stages should be active; and performing, at a second interval shorter

than the first interval, a modulating sequence to modulate the active stages. These steps do not appear to be disclosed in the above-referenced passage of Pouchak '302, and the rejection does not appear to specifically address this claim in any manner. For these and other reasons, claim 12 along with dependent claim 15, are believed to be clearly patentable over the cited reference.

Claim 18 recites a method of staging and modulating a boiler system in response to a load comprising staging and modulating the system using a first control method that is adapted for achieving increased efficiency under a first set of conditions; and staging and modulating the system using a second control method that is adapted to allow cycling of the stages under a second set of conditions. These steps do not appear to be disclosed in the above-referenced passage of Pouchak '302, and the rejection does not appear to specifically address this claim in any manner. For these and other reasons, claim 18 along with dependent claims 19-22 and 24, are believed to be clearly patentable over the cited reference.

Claim 25 recites a method of performing a staging sequence for a multi-stage boiler system in which at least one stage can be either active or inactive, the method comprising: observing an error measured as a difference between a temperature and a setpoint; observing a rate of change of the error; and combining the error and the rate of change of error to determine whether: an inactive stage should become active; an active stage should become inactive; or no change in the number of active stages is necessary. These steps do not appear to be disclosed in the above-referenced passage of Pouchak '302. The rejection specifically notes column 14, lines 21-34, which is quoted above, and does not appear to disclose the particular method recited in claim 25. For these and other reasons, claim 25 and dependent claim 26 are believed to be clearly patentable over the cited reference.

For claim 4, the rejection specifically states that column 13, line 41 is relevant. Applicants note that the above remarks with respect to claim 1 apply to claim 4 as well, and therefore it is believed that claim 4 is clearly patentable over the cited reference.

For claims 6, 7 and 11, the rejection suggests making note of 300. However, the rejection still fails to identify disclosure in the cited reference that would correspond to the independent base claims for each of claims 6, 7 and 11. Thus, for these and other reasons, these claims are also believed to be clearly patentable over the cited reference.

Claim 17 stands rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No.

5,042,431 to Shprecher et al. The rejection cites column 4, line 53 to column 5, line 2, which recites:

The controls appearing inside access panel 50 are illustrated in FIG. 2. In order to make adjustments, a slide switch 52 is moved to the "setup" position, and after all adjustments are completed, it is moved to the "normal" position. When trimmer potentiometers, A1, B1, C1, or D1 are adjusted, the ignition points of the corresponding stages are adjusted. Similarly, when trimmer potentiometers A2, B2, C2, or D2 are pressed, the start of modulation threshold point for enabling the stage after the corresponding stage is set. When pushbutton 42 is pressed repeatedly, LEDs alongside the trimmer potentiometers are lit in turn, and the setting of the corresponding trimmer potentiometer may then be read on display 40. Similarly, potentiometer E permits setting the short-cycling delay in minutes, potentiometer G allows for setback of the setpoint temperature or pressure, and potentiometer H permits adjustments of the standby time in minutes.

It appears that the cited passage allows the user to modify a short-cycling delay, and that the duration of a stand-by mode is adjustable. However, the stand-by mode appears to be a mode in which the boiler is indicated to be turned on, but is waiting for expiration of a delay period. There would appear to be no indication that a first delay is provided after making an inactive stage active and a second delay is provided after making an active stage inactive, wherein the first delay is longer than the second delay. For these and other reasons, claim 17 is believed to be clearly patentable over the cited reference.

On page 3 of the Office Action, claim 5 was rejected under 35 U.S.C. §103(a) as being unpatentable over Pouchak '302 in view of U.S. Patent No. 6,536,678 to Pouchak, with the rejection specifically noting claim 17 of the latter Pouchak patent. However, as indicated above, the rejection of claim 1 fails to specifically address each and every element of the claim. The rejection of claim 5 does not go farther to explain or establish a *prima facie* case of unpatentability. For these and other reasons, claim 5 is believed to be clearly patentable over the cited references.

On page 3 of the Office Action, claims 13, 14 and 23 were rejected as being obvious over Pouchak '302. The rejection states:

Regarding claim 13, 14, and 23, Pouchak '302 discloses all of the limitations of the claim except for disabling a sub-method to activate/deactivate stages for various time periods. However, since the applicant has failed to establish any criticality or synergistic results which are derived from the recited configurations, these limitations are considered a matter of obvious design choice. Thus, the

applicant's design configurations would have been an obvious improvement to one of ordinary skill in the art with regard to the apparatus disclosed in Pouchak '302.

(Office Action at 3). Applicants believe that the above paragraph applies the wrong standard for patentability. The Examiner appears to be stating that the reference fails to show something, but because Applicants have not identified a particular advantage for that which is missing, the claim is obvious. That is simply incorrect. The correct standard for obviousness, as stated in the MPEP, is as follows:

**2143.03 All Claim Limitations Must Be Taught or Suggested**

To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Thus, it is irrelevant whether the Applicants have indicated that certain elements lacking in the cited reference are critical or provide synergistic results which are derived from the recited configuration. In fact, it is believed that, at least because these claims recite elements that appear to be lacking in the cited Pouchak '302 reference, each of these claims is clearly patentable over the cited references.

Claim 16 was not specifically addressed in the substantive portion of the Office Action, and was only objected to. Therefore it is believed that claim 16, as per the above comments related to the claim objections, is in condition for allowance.

Applicants have added newly presented claim 27, which is dependent on claim 1. Claim 27 further recites that the steps of modulating a first stage to operate at less than 100% of its output and modulating a second stage to operate at less than 100% of its output are such that both the first and second stages operate at less than 100% of their respective outputs at the same time. Claim 27 is believed to be clearly patentable over the cited references.

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Reconsideration and reexamination are respectfully requested. It is believed that all pending claims 1-27 are now in condition for allowance. Issuance of a Notice of Allowance in due course is respectfully requested. If a telephone conference would be of assistance, please contact the undersigned attorney at 612-677-9050.

Respectfully submitted,

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